REMARKS

The rejection of Claims 15, 16 and 19 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,020,275 (Stevenson et al), is respectfully traversed. Stevenson et al is stated to be a CIP of application no. 08/440,130 filed May 12, 1995 (parent application), now abandoned. Stevenson et al is available under 35 U.S.C. § 102(e) as of the date of the parent application **only** if the claims in Stevenson et al could have issued in the parent application. See *In re Wertheim*, 646 F2d 527, 537, 209 USPQ 554, 564 (CCPA 1981) **(copy enclosed)** and MPEP § 2136.03(d). Note that the test for determining the effective date of Stevenson et al as a reference is **not** whether the subject matter relied on in a rejection also appears in the parent application.

Applicants thank the Examiner for furnishing Applicants' attorney with a copy of said parent application. A comparison of the claims of Stevenson et al and the complete disclosure in the parent application conclusively shows that the claims in Stevenson et al **could not** have issued in the parent application. For example, all of the independent claims in Stevenson et al recite "each weft yarn being interwoven with the warp yarns independently of adjacent weft yarns, each warp yarn being interwoven with the weft yarns independently of adjacent warp yarns." This subject matter is supported in the disclosure of Stevenson et al at, for example, column 8, lines 46-52. There is no corresponding disclosure in the parent application. Claims with the above-quoted limitation could **not** have issued in the parent application. Thus, Stevenson et al is available as prior art only as of May 9, 1996, or its actual filing date.

Stevenson et al discloses bonded composite open mesh structural textiles for various applications, primarily for engineered earth work construction (column 1, lines 12-35). Stevenson et al's bonded composite open mesh structural textiles are open mesh woven

textiles formed from at least two and preferably three independent but complementary polymeric components (column 4, lines 12-15). The first component, or load bearing member, is a high tenacity, high modulus, low elongation mono- or multi-filament yarn; the second component is a polymer in yarn or other form which will encapsulate and bond yarns at the junctions to strengthen the junctions; the third component is an optional effect or bulking yarn; in the woven textile, a plurality of warp yarns are woven with a plurality of weft yarns, and at least a portion of the warp and weft yarns are first component load-bearing yarns (Abstract). As load-bearing yarns, Stevenson et al lists polyester, polyvinyl alcohol, nylon, aramide, fiberglass, and polyethylene naphthalate as applicable, and having a particular minimum strength and Young's modulus, and a maximum elongation (column 10, lines 17-31). The second component may be provided by a fusible bonding yarn, either mono-filament or multi-filament, which is preferably a bi-component yarn having a low melting temperature sheath and a high melting temperature core, said fusible bonding yarns may be used as warp and/or weft yarns, *inter alia* (paragraph bridging columns 4 and 5), wherein the low melting sheath is preferably one of polyethylene, polyisophthalic acid or the like, and the high melting core is of polyester or the like (column 10, lines 52-55). The low and high melting components also may be polyethylene and polypropylene, respectively, different melting point polyesters, or polyamide and polyester, respectively (column 10, lines 61-64). The mesh structure is generally shown in Fig. 1, wherein the openings 30 are typically between 3/4 to one inch (column 9, lines 10-16).

Stevenson et al neither discloses nor suggests the presently-claimed invention. As recited in Claim 15, the invention is an anisotropic textile, employing high strength and highly elastic fibers having a tensile strength of 3 GPa or more and a tensile elastic modulus of 150 GPa or more as the warp, and fibers having a tensile elastic modulus lower than that of

the warp as the weft, wherein the weft threads comprise composite threads having a weight of 0.1 g or less per meter and comprising two types of fibers having a melting point difference of 50°C or more, and the spacing of the weft threads in the warp direction is within a range of 3 - 15 mm, and by means of the low melting point fibers comprising the weft, the warp and weft adhere to one another.

As recognized by the Examiner, Stevenson et al does not disclose the recited tensile strengths and moduli, the recited weight per meter, the difference in melting temperature, the spacing of the weft yarns, the weight percent of polymeric material binding the weft yarns. Nor, in addition, does Stevenson et al disclose that the weft fibers havw a tensile elastic modulus lower than that of the warp fibers. Indeed, it does not appear that Stevenson et al makes any distinction in properties between their warp fibers and their weft fibers. Stevenson et al's load-bearing member fibers may be composed of both warp and weft yarns (column 4, lines 42-47). Similarly, Stevenson et al's fusible bonding yarn may also be composed of warp and weft yarns (sentence bridging columns 4 and 5). In effect, Stevenson et al does not present a *prima facie* case of obviousness. Thus, various of the recited properties in the claims that are not disclosed by Stevenson et al are not simply the result of optimization of result-effective variables, because the basic structure of the present invention, which involves warp fibers having certain properties, and weft fibers having other properties, are different from the structure of Stevenson et al, where, while different types of fibers are used, that use is not related to whether the yarns are weft yarns or warp yarns.

In addition, the present application claims priority under 35 U.S.C. § 119 based on seven Japanese patent applications, four of them having priority dates earlier than the § 102(e) date of Stevenson et al. **Submitted herewith** is a certified English translation of Japan 8-38048, filed February 26, 1996. The Examiner is respectfully requested to find that

Applicants are entitled to these earlier filing dates with respect to the presently-claimed invention.

For all the above reasons, it is respectfully requested that the rejection over Stevenson et al be withdrawn.

The rejection of Claims 15, 16 and 19 under 35 U.S.C. § 112, second paragraph, is respectfully traversed. Indeed, the rejection is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that it be withdrawn.

All of the presently-pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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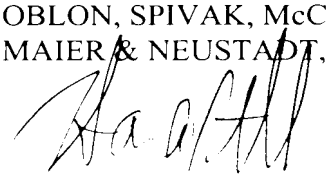

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IN THE CLAIMS

--15. (Amended) An anisotropic textile, employing high strength and highly elastic fibers [(reinforcement fibers)] having a tensile strength of 3 GPa or more and a tensile elastic modulus of 150 GPa or more as the warp, and fibers having a tensile elastic modulus lower than that of the warp as the weft, wherein the weft threads comprise composite threads having a weight of 0.1 g or less per meter and comprising two types of fibers having a melting point difference of 50°C or more, and the spacing of the weft threads in the warp direction is within a range of 3 - 15 mm, and by means of the low melting point fibers comprising the weft, the warp and weft adhere to one another.

16. (Amended) An anisotropic textile in accordance with claim 15, wherein the composite threads used as the weft threads comprise composite threads in which high melting point fibers having a tensile elastic modulus within a range of 50 - 100 GPa and a melting point of 200°C or more, and low melting point fibers having a tensile elastic modulus of 50 GPa or less and a melting point of 150°C or less are unified by the deposition of 0.5 - 10 weight percent of a high molecular weight compound which melts or softens at temperatures of 150°C or less.

19. (Amended) An anisotropic textile in accordance with claim 16, wherein the high molecular weight compound is dissolved in [the] a reactive mixture having a gelling time of

15 minutes or more at 25°C and which is capable of initiating polymerization at 5°C, and which is sufficiently curable in 6 hours or less at 5°C.

Claims 20-26 (New).--

08/440130

TEXTILE GRID

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to textile grids primarily designed for use as geogrids in earth reinforcements such as retaining walls, steep slopes, soil veneers, embankments and base reinforcements although such materials have significant utility wherever grids are commonly used such as in landfill applications, erosion protection systems, seat cushions, mattress insulators, packaging, fencing, restraint systems and the like. While the grid materials of this invention have diverse applications, since they are especially designed to provide unique characteristics which are important in stabilizing and reinforcing civil engineering structures, particular emphasis will be placed on such use throughout this application.

2. Description of the Prior Art

Geogrids are members which are used to stabilize, reinforce, strengthen and retain soils in earthen structures. There are two general types of geogrids: 1) integral geogrids and 2) non-integral geogrids.

Integral geogrids are formed by extruding a flat sheet, punching the sheet in a square or rectangular pattern and then uniaxially or biaxially stretching the apertured sheet, or by integrally extruding a mesh structure which is then uniaxially or biaxially stretched. Non-integral geogrids are typically formed using textile technology and are hereinafter referred to as "textile geogrids".

Integral geogrids are well known in the market. Textile geogrids have carved a niche in the market because of their high ultimate tensile strength, resistance to creep and certain other characteristics.

The characteristics of the two geogrid types are significantly different in several respects. The integral products are stiff, rigid and exhibit high initial modulus. The textile products exhibit textile characteristics such as flexibility, soft hand and high elongation. However, textile geogrids in the market today typically have moderate initial modulus, poor joint strength, a thin profile and high creep resistance. These properties primarily result from the fact that typical textile geogrids employ a conventional type of fiber (e.g., industrial grades of high tenacity polyester) in a woven or a knitted structure.

Resistance to elongation is the principal element in the strengthening or reinforcing component of a civil engineering design. Integral geogrids have high initial modulus and low elongation at break. Textile geogrids have high elongation at break, up to 50% when no testing preload is employed or allowed, and a moderate initial modulus. Thus, textile geogrids on the market today do not have elongation properties which permit them to effectively compete with integral products in certain applications.

Typical textile geogrids also have poor junction strength. In reinforcing applications, grids interact with the soil (or fill material) by the process of the soil penetrating the interstices of the grid. The result is that the grid and the soil act together as a solid unit. Both the longitudinal strength members and the transverse members of the grid are essential in this interlocking (and reinforcing) process. If the junction between the longitudinal and the transverse members fails, the grid ceases to function as a grid and the reinforcement effect is substantially reduced.

Attempts have been made to improve the junction or joint strength of textile geogrids. The fabric may be coated with a chemical after it leaves the loom. The chemical (e.g., polyvinylchloride), once dried, tends to lock the fabric weave as well as protect the fiber bundle from abrasion and to enhance soil fabric friction. However, sufficient junction strength has not

been achieved to make textile geogrids competitive with extruded sheet products for certain demanding applications.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved textile grid.

It is another object of the present invention to provide an improved woven grid.

It is a further object of the present invention to provide improved woven grids which have one or more of the following properties: very low elongation, very high modulus, high initial modulus, high ultimate tensile strength, very low creep, excellent joint strength and substantial bulk in the structure yielding a relatively thick profile.

These and other objects of the present invention will become apparent with reference to the following specification and claims.

Grids according to the present invention are formed of woven fabric. The fabric is formed from at least two, and preferably three, components. The first component, or load bearing member, is a high tenacity, high modulus, low elongation mono- or multifilament yarn. The second component is a fusible bonding yarn, either monofilament or multifilament, which is preferably a bicomponent yarn having a low melting sheath and a high melting core. The third component is an optional effect or bulking yarn.

In the woven fabric, a plurality of warp yarns are woven with a plurality of weft (fill) yarns. The weave preferably includes a half-cross or full-cross leno weave. At least a portion of the warp and weft yarns are first component load bearing yarns. The fusible bonding yarns are used as warp and/or weft yarns and/or leno yarns as required for the bonding properties necessary for the finished geogrid product, and especially to provide improved junction or joint strength. The effect or bulking yarns are used as warp and/or weft yarns as required to provide the desired bulk in the fabric and relatively thick profile for the finished product.

After the fabric is woven, the fabric is heated to melt the fusible component, e.g., to melt the sheath of the bicomponent fibers. This causes the fusible component to flow around and encapsulate other components of the fabric and protects, strengthens and stiffens the geogrid junctions.

Grids according to the present invention have a number of advantages compared to conventional textile grids. The grids can be modified for various applications by selection of the type and location of the first component load bearing yarns and the second component fusible yarns, and the type and location of the third component optional bulking yarns. Thus, the grids can be custom tailored for particular applications.

Grids according to the present invention can be designed for strength in the longitudinal direction or both the longitudinal and transverse directions. The use of fusible yarns to strengthen the junctions also permits increased flexibility in grid design. And, inexpensive bulking yarns may be used in a variety of ways to provide bulk without sacrificing strength and other desirable characteristics.

Finally, grids according to the present invention can be manufactured using conventional weaving equipment. This minimizes production costs and maximizes the use of fixed plant equipment.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a woven grid according to the present invention.

Fig. 2 is an exploded schematic plan view of a portion of the woven fabric of Fig. 1.

Fig. 3 is an exploded schematic plan view of a portion of a woven fabric construction for a grid according to the present invention showing another weaving pattern.

Fig. 4 is an exploded schematic plan view of a portion of a woven fabric construction for a grid according to the present invention showing yet another weaving pattern.

Fig. 5 is an exploded schematic plan view of a portion of a woven fabric construction for a grid according to the present invention showing a further weaving pattern.

Fig. 6 is a schematic sectional view of a retaining wall formed using textile geogrids according to the present invention.

Fig. 7 is a schematic sectional view of a reinforced embankment constructed over weak foundation soils using textile geogrids according to the present invention.

Fig. 8 is a schematic sectional view of reinforced steep slopes which increase the capacity of sludge containment of a sludge containment pond using textile geogrids according to the present invention.

Fig. 9 is a schematic sectional view of a landfill liner support provided by a textile geogrid according to the present invention.

Fig. 10 is a schematic sectional view of the stability of soil veneer on a slope liner provided by a textile geogrid according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to Figs. 1 and 2, the bidirectional woven fabric 10 is formed into an openwork grid structure 12 of the present invention. Fabric 10 is formed of a plurality of spaced apart weft yarn bundles 14. Each weft yarn bundle is formed of a plurality of weft, filling or pick yarns 16 (16a-f). Each bundle 14 of weft yarns 16 includes edge weft or pick yarns 16a and 16f. The weft yarn bundles 14 are woven together with a plurality of spaced apart warp yarn bundles 18. Each of the warp yarn bundles 18 is formed of a plurality of warp yarns 20 (20a-h). Each bundle of warp yarns 18 includes edge warp yarn pairs 20a-b and 20g-h.

At the junctions or joints 22 of the grid 12, the weft yarns 16 are interlaced or interwoven with the warp yarns 20. As illustrated in Figs. 1 and 2, the warp ends of adjacent warp yarn pairs 20a and 20b, 20c and 20d, 20e and 20f, and 20g and 20h, respectively, are alternately twisted in a right- and left-hand

direction crossing at 24 (180°) and 25 (180°) to provide a complete twist (360°) or full-cross leno weave between adjacent weft yarn bundles 14. Alternatively, the warp ends of adjacent warp yarns 20 are twisted in only one direction between adjacent weft yarn bundles 14 to form a half twist (180°) or half-cross leno weave (not shown) between adjacent weft yarn bundles 14.

The fabric of the present invention may be formed on any conventional loom such as a Rapier loom. As illustrated in Figs. 1 and 2, each weft yarn bundle 14 has six weft yarns 16a-f and each warp yarn bundle 18 has eight warp yarns 20a-h. The loom will typically throw fourteen to twenty-four false picks for a complete cycle of twenty to thirty picks. The maximum total picks per inch will typically be about 20 to 36. The number of warp ends per inch will typically be about 6 to 18.

The grid 12 has lateral or cross-machine members 26 (weft yarn bundles 14) and longitudinal or machine direction members 28 (warp yarn bundles 18) which interconnect at the junctions 22 to define relatively large openings 30 through which soil, water or other material may pass when the grid 12 is placed in the earth. The openings 30 will typically be about 3/4 to 1 inch. While openings 30 are illustrated as square, the openings may be rectangular. The shape of the openings 30 will depend on the performance requirements of the grids; however, the shape and size of the openings can be selected by adjusting the relative positioning of the weft yarn bundles 14 and the warp yarn bundles 18. Grid 12 has a first side 32 and second side 34.

Figs. 3-5 show additional fabric constructions for grids according to the present invention in which the same reference numerals are used as in Fig. 1 for the same components or elements except in the "100", "200" and "300" series, respectively. More specifically, Fig. 3 shows a fabric 100 construction which is similar to fabric 10 of Fig. 1 except only the warp ends of adjacent warp yarn pairs 120a and 120b, and 120g and 120h, respectively, encircle with a half twist at 124 (180°) and 125 (180°) to provide a complete twist (360°) or full-cross leno weave

between adjacent weft yarn bundles 114. As with respect to Figs. 1 and 2, alternatively the warp ends of warp yarn pairs 120a and 120b, and 120g and 120h, respectively, may encircle with only a half twist (180°) between adjacent weft yarn bundles 114 to form a half-cross leno weave (not shown) between adjacent weft yarn bundles 114.

Fig. 4 shows another woven fabric construction 200. In this construction, a leno yarn 236 is woven in yet another form of half-cross leno weave into fabric construction 200. Leno yarn 236 is woven at section 236a diagonally to warp yarn bundle 218 along second side 234 of grid 212, at section 236b parallel to warp yarn bundle 218 along first side 232 of grid 212, and at section 236c diagonally to warp yarn bundle 218 along second side 234 of grid 212. Alternatively, section 236b of leno yarn 236 may be interlaced or interwoven with weft yarns 216 of weft yarn bundle 214. Leno yarn 236 is woven under tension and gives firmness and compactness to weft and warp yarn bundles 214 and 218, preventing slipping and displacements of weft yarns 216 and warp yarns 220. Leno yarn 236 also increases the strength of junction 222.

Fig. 5 shows a fabric construction 300 which is similar to fabric construction 200 of Fig. 3 except two leno yarns 336 and 338 are woven in still another half-cross leno weave into fabric construction 300 and both sections 336b and 338b of leno yarns 236 and 238, respectively, are interlaced or interwoven with weft yarns 316 of weft yarn bundle 314. Also, leno yarn 338 is woven at section 338a diagonally to warp yarn bundle 318 along first side 332 of grid 312 and at section 338c diagonally to warp yarn bundle 318 along first side 332 of grid 312. Both leno yarns 336 and 338 are woven under tension to prevent slipping and displacements of weft yarns 316 and warp yarns 320 and to increase the strength of junction 322.

Figs. 3-5 are exploded schematic plan views like Fig. 2. However, it should be understood that the junctions 122, 222 and 322 in Figs. 3-5, respectively, are tightly interlaced or

interwoven in similar manner to the junction 22 illustrated in Fig. 1.

A majority of the weft and warp yarns are preferably the load bearing member, namely, the high tenacity, low modulus, low elongation mono- or multifilament yarns. Suitable mono- or multifilament yarns are formed from polyester, polyvinylalcohol, nylon, aramid, fiberglass, and polyethylene naphthalate.

The load bearing member should have a strength of at least about 5 grams per denier, and preferably at least about 9 to 10 grams per denier. The initial Young's modulus of the load bearing member should be about 100 grams/denier, preferably about 150 to 400 grams/denier. The elongation of the load bearing member should be less than about 18%, preferably less than about 10%. The load bearing member will typically have a denier of about 1,000 to 2,000, preferably about 2,000 to 8,000.

The grids can be produced with approximately equal strength in the longitudinal or machine direction and in the lateral or cross-machine direction. Alternatively, the grids can be produced with greater strength in either the longitudinal direction or the lateral direction. The selection of the strength characteristics of the grids will be determined based on the requirements of the application design.

The fusible bonding yarns are used as warp and/or weft yarns and/or leno yarns as required for the desired bonding properties, and especially the bonding properties needed to form the necessary strength of the junctions. When the fabric is heated to melt the fusible component, the fusible component flows around and encapsulates other components of the fabric bonding and stabilizing the fabric structure and protecting the load bearing yarns from abrasion and chemical attack. The fusible yarn may be a monofilament or multifilament form of yarn.

The preferred fusible yarn is a bicomponent yarn such as one having a low melting sheath of polyethylene or the like, and a high melting core of polyester or the like. The bicomponent yarn also may be a side-by-side yarn in which two different components

(one low melting and one high melting) are fused along the axis and having an asymmetrical cross-section, or a biconstituent yarn having one component dispersed in a matrix of the other component, the two components having different melting points. The low and high melting components also may be polyethylene and polypropylene, respectively, different melting point polyesters, or polyamide and polyester, respectively. The bicomponent yarn will typically be composed of 30 to 70% by weight of the low melting component, and 70 to 30% by weight of the high melting component. The fusible yarn also may be an extrusion coated yarn having a low melting coating or a low melting point yarn (e.g., polyethylene) employed in the fabric structure side-by-side with other yarns.

The effect or bulking yarns are used as warp and/or weft yarns as required to provide the desired bulk in the fabric and relatively thick profile of the finished product. The bulking yarns are generally made from low cost, partially oriented, polyester, polyethylene or polypropylene yarns or the like. The individual bulking yarn components will typically have a denier of about 150 to 300, preferably about 300 to about 1,000.

The bulking yarns may be textured yarns produced from conventional yarns by a known air texturing process. The air texturing process uses compressed air to change the texture of a yarn by disarranging and looping the filaments or fibers that make up the yarn bundle. The texturing process merely rearranges the structure of the yarn bundle with little changes in the basic properties of the individual filaments or fibers occurring. However, the higher the bulk, the higher the loss in strength and elongation.

In addition to using individual load bearing yarns, the present invention also contemplates forming composite yarns prior to fabric formation in which the load bearing yarn is combined with a fusible bonding yarn or a bulking yarn. The composite may be formed using air jet texturing in which the load bearing yarn comprises the core and the fusible bonding yarn or bulking yarn is textured. The core is fed with minimal overfeed and with an excess

quantity of fusible or bulking yarn with substantially higher overfeed. The compressed air rearranges and loops the filaments or fibers of the fusible yarn or bulking yarn to increase the bulk of the composite yarn. Composite yarns incorporating the load bearing yarn may also be made by known techniques such as twisting or cabling. The fusible yarn, especially of the monofilament type, also may be combined with the bulking yarn prior to fabric formation such as by parallel end weaving, or by twisting, cabling or covering (single or double helix cover).

Referring to Figs. 1-5 again, the fusible bonding yarn would typically be used as warp yarns 20a and 20h, or warp yarn pairs 20a-b and 20g-h, in Figs. 1-2. In Fig. 3, warp yarns 120a and 120h, or warp yarn pairs 120a-b and 120g-h, would typically be fusible yarns. In Figs. 4 and 5, the fusible yarn could be the leno yarn 236, and leno yarns 336 and 338, respectively. However, the fusible yarn could be incorporated into the woven fabrics illustrated in Figs. 1-5 in many other ways.

The grid of the present invention can be finished by calendaring which is a process of applying heat which softens the fusible yarn (e.g., the sheath of a bicomponent yarn) permitting it to flow through and around and encapsulate other yarns at the junctions, and in the warp and weft yarn bundles, thus locking the fabric in place without imparting crimp which creates part of the excessive mechanical elongation of conventional products.

The results of the calendaring or finishing process are

(a) the yarn bundles are protected against impact and abrasion;

(b) the fabric is protected against impact and abrasion;

(c) the yarn bundles are stiffened with better resistance to elongation and with lower ultimate elongation;

(d) the fabric is stiffened with better resistance to elongation and with lower ultimate elongation;

(e) the yarn bundles are frozen in a fixed bulk for better soil fabric interaction;

(f) the fabric is frozen in a fixed bulk for better soil fabric interaction; and

(g) the junctions are protected, strengthened and stiffened.

Fig. 6 shows a retaining wall 400 formed using textile grids 402 (e.g., grid 12 of Figs. 1 and 2, grid 112 of Fig. 3, grid 212 of Fig. 4, or grid 312 of Fig. 5) of the present invention. Foundation or substrate 404 is graded to a desired height and slope. Retaining wall 406 is formed from a plurality of retaining wall elements 406a. A plurality of grids 402 are attached to the retaining wall 406 at 408. The grids 402 are separated by a plurality of fill layers 410. Using this construction, random fill 412 is retained and held in place.

The retaining wall 406 is illustrated generically as comprising a plurality of courses of modular wall elements 406a such as conventional cementitious modular wall blocks. It is to be understood, however, that similar wall structures can be formed using modular wall blocks formed of other materials, including plastic. Likewise, retaining walls incorporating the textile grids of this invention can be constructed with cast wall panels or other conventional facing materials.

While no detail is shown for connection of the textile grids to the retaining wall elements, various techniques are conventionally used, including bodkin connections, pins, staples, hooks or the like, all of which may be readily adapted by those of ordinary skill in the art for use with the textile grids of this invention.

When embankments are constructed over weak foundation soils the pressure created by the embankment can cause the soft soil to shear and move in a lateral direction. This movement and loss of support will cause the embankment fill material to shear which results in a failure of the embankment. This type of failure can be prevented by the inclusion of textile grids 420 (e.g., grid 12 of Figs. 1 and 2, grid 112 of Fig. 3, grid 212 of Fig. 4, or grid 312 of Fig. 5) of the present invention in the lower portions

of the embankment 422 as shown in Fig. 7. The textile grids 420 provide tensile strength that prevents the embankment from failing.

Reinforced earth structures may be built to steep slope angles which are greater than the natural angle of repose of the fill material by the inclusion of textile grids. Steep slopes can be used in many applications to decrease the amount of fill required for a given earth structure, increase the amount of usable space at the top of the slope, decrease the intrusion of the toe of the slope into wetlands, etc. In Fig. 8, a steep slope dike addition is shown. By using steep slopes 430, the amount of fill required to raise the dike elevation is reduced and the load that is placed on both the existing containment dike 432 and on the soft sludge 434 is also reduced. A dramatic increase in containment capacity is achieved through the use of steep slopes 430 reinforced with textile grids 436 (e.g., grid 12 of Figs. 1 and 2, grid 112 of Fig. 3, grid 212 of Fig. 4, or grid 312 of Fig. 5) of the present invention.

When embedding the textile grids of this invention in a particulate material such as soil or the like, the particles of aggregate engage the upper and lower surfaces of the grid and "strike through" the openings thereby forming a reinforcing and stabilizing function. Likewise, such grid materials are effective to provide a separating or filtering function when embedded in soil or the like.

In addition to their earth reinforcement applications, the textile grids of this invention are especially useful in landfill and industrial waste containment constructions. Regulations require that the base and side slopes of landfills be lined with an impermeable layer to prevent the leachate from seeping into natural ground water below the landfill. When landfills are located over terrain which is compressible or collapsible, as in the case of Karst terrain, the synthetic liner will deflect into the depression. This deflection results in additional strains being induced into the liner which can cause failure of the liner and seepage of the leachate into the

underlying ground water thus causing contamination. Through the use of the high tensile strength of textile grid 440 (e.g., grid 12 of Figs. 1 and 2, grid 112 of Fig. 3, grid 212 of Fig. 4, or grid 312 of Fig. 5) of the present invention as shown in Fig. 9 liner 442 support can be provided by positioning the textile grid 440 immediately below the liner 442. Should any depression 444 occur, the high tensile capacity of the textile grid 440 provides a "bridging" affect to span the depression and to minimize the strain induced into the liner 442 thereby helping to protect the landfill system from failure.

Construction of landfills requires that the geomembrane liners be placed across the bottom of the landfill and up the side slopes of the landfill as well. In order to protect this liner, a layer of cover soil, known as a veneer, which has a dual purpose of liner protection against punctures from waste material placement and leachate collection is normally placed on top of the liner. Since the surface of the liner is smooth, the cover soil can fail by simply sliding down the slope since the friction between the soil and the liner is too small to support the weight of the soil layer. This type of failure can be prevented by the placement of a textile grid 450 (e.g., grid 12 of Figs. 1 and 2, grid 112 of Fig. 3, grid 212 of Fig. 4, or grid 312 of Fig. 5) of the present invention as shown in Fig. 10 anchored at the top and extending down to the toe of the slope 452. The apertures (e.g., 30 in Figs. 1 and 2, 130 in Fig. 3, 230 in Fig. 4 and 330 in Fig. 5) of the textile grid 450 allow the cover soil 454 to interlock with the grid 450 and the grid 450 in turn provides the tensile force required to hold this block of soil in place, thus eliminating the sliding on the liner 456.

Grids of the present invention also may be used in other applications to reinforce soil or earth structures such as base reinforcement for roadways (e.g., earth, gravel or other particulate materials, base applications, or to reinforce bituminous materials such as asphalt) and airport runways. Additionally, these grids may be used in the construction of

geocells or retaining walls for marine use to control land erosion adjacent to waterways such as rivers, streams, lakes and oceans.

As indicated, while the textile grid materials of this invention have particular utility as geogrids, they are also adapted for any application where grid or net products have been used heretofore. For example, the novel grids described herein have excellent strength and related characteristics for use in the formulation of gabions as well as in fencing applications or safety barriers. Additionally, they may be readily adapted for use as seat cushions, mattress insulators and in diverse packaging applications, including pallet wraps and the like, and in various original equipment manufacturing applications.

Having described the invention, many modifications thereto will become apparent to those skilled in the art to which it pertains without deviation from the spirit of the invention as defined by the scope of the appended claims.

WE CLAIM:

1. A woven grid, comprising:

a plurality of spaced apart bundles of weft yarns;

a plurality of spaced-apart bundles of warp yarns, the warp yarn bundles intersecting with the weft yarn bundles at a plurality of junctions to define openings between adjacent weft and warp yarn bundles, the weft yarns and the warp yarns being interwoven at the junctions;

a portion of the warp and weft yarns comprising load bearing yarns, the load bearing yarns being high tenacity, high modulus, low elongation yarns; and

the junctions of the grid comprising at least one fusible bonding yarn which has a fusible component which will melt when heated to flow around, encapsulate and bond adjacent yarns to strengthen the junctions.

2. The woven grid of claim 1, wherein the junctions of the grid further comprise at least one leno yarn.

3. The woven grid of claim 2, wherein the leno yarn forms a full-cross leno weave between adjacent weft yarn bundles.

4. The woven grid of claim 2, wherein the leno yarn forms a half-cross leno weave between adjacent weft yarn bundles.

5. The woven grid of claim 2, wherein the leno yarn is interwoven with the weft yarns at the junctions.

6. The woven grid of claim 2, wherein the leno yarn is the fusible bonding yarn.

7. The woven grid of claim 2, wherein the leno yarn is woven under high tension.

8. The woven grid of claim 1, wherein the fusible yarn is a bicomponent yarn having a low melting fusible component and a high melting component.

9. The woven grid of claim 7, wherein the bicomponent yarn is composed of 30 to 70% by weight of the low melting sheath and 70 to 30% by weight of the high melting core.

10. The woven grid of claim 1, wherein the fusible bonding yarn comprises edge warp yarns of the warp yarn bundles.

11. The woven grid of claim 1, wherein the fusible bonding yarn comprises edge pairs of warp yarns of the warp yarn bundles.

12. The woven grid of claim 1, wherein a portion of the warp and weft yarns comprise bulking yarns to provide a relatively thick profile for the woven grid.

13. The woven grid of claim 12, wherein the bulking yarns are produced from partially oriented polyester, polyethylene or polypropylene yarns.

14. The woven grid of claim 1, wherein the load bearing yarns are composite yarns in which the load bearing yarn is combined with a fusible bonding yarn or a bulking yarn.

15. The woven grid of claim 14, wherein the composite yarns are formed by air jet texturing.

16. The woven grid of claim 14, wherein the composite yarns are formed by twisting, cabling or covering.

17. The woven grid of claim 1, wherein the load bearing yarns have a strength of at least about 5 grams per denier, a modulus of at least about 100 grams per denier and an elongation of less than about 18%.

18. The woven grid of claim 1, wherein the load bearing yarns have a strength of at least about 9 to 10 grams per denier, a modulus of at least about 100 grams per denier, and an elongation of less than about 18%.

19. The woven grid of claim 1, wherein the load bearing yarns have a denier of about 1,000 to 8,000.

20. The woven grid of claim 1, wherein the load bearing yarns are formed from polyester, polyvinylalcohol, nylon, aramid, fiberglass or polyethylene naphthalate.

21. A composite civil engineering structure comprising a mass of particulate material and at least one reinforcing grid embedded therein, wherein said reinforcing grid is a woven grid according to claim 1, portions of said mass of particulate material being below said reinforcing grid, portions of said mass of particulate material being above said reinforcing grid, and portions of said mass of reinforcing material being within said openings defined between adjacent weft and warp yarn bundles.

22. The composite civil engineering structure of claim 21, further including a retaining wall, portions of said reinforcing grid being secured to said retaining wall, said mass of particulate material, said reinforcing grid and said retaining wall together defining a reinforced retaining wall.

23. The composite civil engineering structure of claim 22, comprising a plurality of said woven grids in vertically spaced relationship.

24. The composite civil engineering structure of claim 21, wherein said mass of particulate material and reinforcing grid together define a stabilized embankment.

25. The composite civil engineering structure of claim 24, comprising a plurality of said woven grids in vertically spaced relationship.

26. The composite civil engineering structure of claim 21, wherein said mass of particulate material and reinforcing grid together define a steep slope.

27. The composite civil engineering structure of claim 26, comprising a plurality of said woven grids in vertically spaced relationship.

28. The composite civil engineering structure of claim 26, wherein said steep slope is a dike addition to raise the dike elevation of a containment dike.

29. The composite civil engineering structure of claim 21, wherein said mass of particulate material and reinforcing grid together with a liner define a landfill.

30. The composite civil engineering structure of claim 29, wherein said landfill is for terrain which is compressible or collapsible and said reinforcing grid is positioned immediately below said liner.

31. The composite civil engineering structure of claim 29, wherein said landfill includes a side slope and said reinforced grid is anchored at a top of said slope and extends down to a toe of said slope, said reinforcing grid being positioned above said liner.

32. A method of constructing a composite civil engineering structure comprising:

providing a mass of particulate material,

providing at least one woven reinforcing grid according to claim 1, and

embedding said reinforcing grid in said mass of particulate material with portions of said mass of particulate material being below said reinforcing grid, portions of said mass of particulate material being above said reinforcing grid, and portions of said mass of particulate material being within said openings defined between adjacent weft and warp yarn bundles.

33. The method of constructing a composite civil engineering structure of claim 32, further including providing a retaining wall, securing portions of said reinforcing grid to said retaining wall, said mass of particulate material, said reinforcing grid and said retaining wall together defining a reinforced retaining wall.

34. The method of constructing a composite civil engineering structure of claim 33, comprising embedding a plurality of said woven grids in said mass of particulate material in vertically spaced relationship.

35. The method of constructing a composite civil engineering structure of claim 32, wherein said mass of particulate material and reinforcing grid together define a stabilized embankment.

36. The method of constructing a composite civil engineering structure of claim 35, comprising embedding a plurality of said woven grids in said mass of particulate material in vertically spaced relationship.

37. The method of constructing a composite civil engineering structure of claim 32, wherein said mass of particulate material and reinforcing grid
together define a steep slope.

38. The method of constructing a composite civil engineering structure of claim 37, comprising embedding a plurality of said woven grids in said mass of particulate material in vertically spaced relationship.

39. The method of constructing a composite engineering structure of claim 37, wherein said steep slope is a dike addition to raise the dike elevation of a containment dike.

40. The method of constructing a composite civil engineering structure of claim 32, wherein said mass of particulate material and reinforcing grid together with a liner define a landfill.

41. The method of constructing a composite civil engineering structure of claim 40, wherein said landfill is for terrain which is compressible or collapsible and said reinforcing grid is embedded in said mass of particulate material immediately below said liner.

42. The method of constructing a composite civil engineering structure of claim 40, wherein said landfill includes a side slope and said reinforced grid is anchored at a top of said slope and extends down to a toe of said slope, said reinforcing grid being embedded in said mass of particulate material above said liner.

43. In a woven grid having a plurality of junctions defining openings, the improvement comprising:

load bearing yarns defining at least a portion of the junctions, the load bearing yarns being high tenacity, high modulus, low elongation yarns; and

the junctions of the grid comprising at least one fusible bonding yarn which has a fusible component which will melt when heated to flow around, encapsulate and bond adjacent yarns to strengthen the junctions.

44. The woven grid of claim 43, wherein the junctions of the grid further comprise at least one leno yarn.

45. The woven grid of claim 43, wherein the leno yarn is the fusible bonding yarn.

46. The woven grid of claim 43, wherein the fusible yarn is a bicomponent yarn having a low melting fusible component and a high melting component.

47. The woven grid of claim 43, wherein the load bearing yarns have a strength of at least about 5 grams per denier, a modulus of at least about 100 grams per denier and an elongation of less than about 18%.

48. The woven grid of claim 43, wherein the load bearing yarns have a strength of at least about 9 to 10 grams per denier, a modulus of at least about 100 grams per denier, and an elongation of less than about 18%.

49. The woven grid of claim 43, wherein the load bearing yarns have a denier of about 1,000 to 8,000.

50. The woven grid of claim 43, wherein the load bearing yarns are formed from polyester, polyvinylalcohol, nylon, aramid, fiberglass or polyethylene naphthalate.

Abstract of the Disclosure

Grids are formed of woven fabric. The fabric is formed from at least two, and preferably three, components. The first component, or load bearing member, is a high tenacity, high modulus, low elongation mono- or multifilament yarn. The second component is a fusible bonding yarn, either monofilament or multifilament, which is preferably a bicomponent yarn having a low melting sheath and a high melting core. The third component is an optional effect or bulking yarn. In the woven fabric, a plurality of warp yarns are woven with a plurality of weft (fill) yarns. The weave preferably includes a half-cross or full-cross leno weave. At least a portion of the warp and weft yarns are first component load bearing yarns. The fusible bonding yarns are used as warp and/or weft yarns and/or leno yarns as required for the bonding properties necessary for the finished geogrid product, and especially to provide improved junction or joint strength. The effect or bulking yarns are used as warp and/or weft yarns as required to provide the desired bulk in the fabric and relatively thick profile for the finished product.

In re Wertheim and Mishkin

(CCPA)
209 USPQ 554

Decided Apr. 9, 1981
No. 80-603
U.S. Court of Customs and Patent Appeals

Headnotes

PATENTS

1. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Patents -- Unclaimed disclosure (§ 51.2223)

Section 102(e) is codification of rule of Alexander Milburn Co. v. Davis-Bournonville Co., 270 US 390, which held that material disclosed but not claimed in U.S. patent may be used as reference to anticipate later invention as of date reference application was filed, rather than date patent finally issued.

2. Patentability -- Anticipation -- In general (§ 51.201)

Patentability -- Anticipation -- Combining references (§ 51.205)

Patentability -- Invention -- In general (§ 51.501)

Pleading and practice in Patent Office -- Rejections (§ 54.7)

Sections 102(e)/103 rejection is one utilized where Section 102(e) alone may fail since not every material limitation of claimed invention is disclosed in reference; that reference, referred to

as "prior art" in Section 103, may be combined with another to support obviousness rejection.

3. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Patents -- On copending applications (§ 51.2219)

Patentability -- Anticipation -- Patents -- Unclaimed disclosure

Patentability -- Invention -- In general (§ 51.501)

Pleading and practice in Patent Office -- Rejections (§ 54.7)

In re Switzer, 77 USPQ 156, 159, since its reasoning is unclear, lends no aid to resolution of dispute of what patent disclosure, or portion of it, which has been carried over through chain of applications, may be traced back to earlier application and given its effective date, and then combined with secondary reference to reject later filed claims under Sections 102(e)/103.

4. Patentability -- Anticipation -- Patent applications (§ 51.219)

Abandoned application by itself can never be reference.

5. Patentability -- Invention -- In general (§ 51.501)

"The invention" referred to in Section 103 is, in every case, nothing more nor less than subject matter being claimed by applicant, which is starting point of all inquiry about obviousness.

6. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Publications -- In general (§ 51.2271)

Disclosure of primary reference patent that shows all of claimed invention and that issued at least four years and nine months subsequent to that invention's entitlement date is not prior art with respect to that invention as a patent or as a publication.

7. Amendments to patent application -- New matter (§ 13.5)

Applications for patent -- Continuing (§ 15.3)

Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Patents -- On copending applications (§ 51.2219)

Patentability -- Anticipation -- Patents -- Unclaimed disclosure (§ 51.2223).

Patentability -- Invention -- In general (§ 51.501)

Approach in which one reaches back to parent application of primary reference patent, retrieves subject matter that was "carried over" into patent, and combines it with secondary reference to find invention obvious, although embraced in In re Wertheim, 191 USPQ 90, ignores, in situations where there are continuation in part applications, rationale behind Alexander Milburn Co. v. Davis-Bournonville Co., 270 US 390, and Hazeltine Research Inc. v. Brenner, 147 USPQ 429, that "but for" delays in Patent Office, patent would have earlier issued and would have been prior art known to public; continuation-inpart application adds new matter to previously-filed parent application; thus, type of new matter added must be inquired into, for if it is critical to claimed invention's

patentability, patent could not have issued on earlier filed application and theory of Patent Office delay has no application; additionally, Section 120 enters picture at this point in analysis, for phrase in Section 102(e), "on an application for patent," necessarily invokes Section 120 rights of priority for prior co-pending applications; Patent Office that wishes to utilize against applicant part of patent disclosure found in application filed earlier than date of application that became patent must demonstrate that earlier-filed application contains Sections 120/112 support for invention claimed in reference patent; patent that could not theoretically have issued day application was filed is not entitled to be used against another as "secret prior art," rationale of Milburn being inapplicable; in other words, "secret prior art" doctrine of Milburn and Hazeltine are extended only so far as logic of those cases requires.

8. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Patents -- Unclaimed disclosure (§ 51.2223)

Patentability -- Invention -- In general (§ 51.501)

Reference patent whose application does not describe invention at issue, as claimed, cannot

be used as reference under Section 102(e) alone against that application as of reference application's date.

9. Applications for patent -- Continuing (§ 15.3)

Patentability -- Anticipation -- Patents -- On copending applications (§ 51.2219)

Conditions under which filing date earlier than that of last in series of applications on which patent issues may be accorded to patent with respect to any given claimed subject matter are set forth in Section 120.

10. Applications for patent -- Continuing (§ 15.3)

Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Invention -- In general (§ 51.501)

Specification -- Sufficiency of disclosure (§ 62.7)

Sections 102(e), 120, and 112 speak with reference to some specific claimed subject matter by use of terms "for an invention," "as to such invention," "of the invention," and "his invention"; questions of description, disclosure, enablement, anticipation, and obviousness can only be discussed with reference to specific claim that identifies "the invention" referred to in statute sections.

11. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Invention -- In general (§ 51.501)

Specification -- Sufficiency of disclosure (§ 62.7)

Invention claimed in primary reference patent that does not find supporting disclosure in compliance with Section 112, as required by Section 120, in one of its applications, as well as its accompanying disclosure, cannot be regarded as prior art as of that application's filing date.

12. Amendments to patent application -- New matter (§ 13.5)

Applications for patent -- Continuing (§ 15.3)

Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Patents -- On copending applications (§ 51.2219)

Patentability -- Invention -- In general (§ 51.501)

New matter can add material limitations that transform unpatentable invention, when viewed as whole against prior art, into patentable one; continuation-in-part application, unlike continuation application, does not necessarily insure that all critical aspects of later disclosure were present in parent; thus, in such situation, only application disclosing patentable invention before new matter's addition, which disclosure is carried over into patent, can be relied upon to give reference disclosure benefit of its filing date for purpose of supporting Sections 102(e)/103 rejection.

13. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Specification -- Sufficiency of disclosure (§ 62.7)

Only date primary reference patent that issued after series of applications has under Section 102(e) is filing date of application on which it issued; any earlier U.S. filing date for patent necessarily depends on further compliance with Sections 120 and 112.

14. Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Invention -- In general (§ 51.501)

Specification -- Sufficiency of disclosure (§ 62.7)

Portions of original reference patent's disclosure that do not constitute full, clear, concise, and exact description in accordance with Section 112, first paragraph, of invention claimed in reference patent, else application could not have matured into patent within Section 102(e) rationale of Alexander Milburn Co. v. Davis-Bournonville Co., 270 US 390, cannot be "carried

over" for purpose of awarding filing dates, to be "prior art" under Section 103.

15. Applications for patent -- Continuing (§ 15.3)

Patentability -- Anticipation -- Patents -- In general (§ 51.2211)

Patentability -- Anticipation -- Patents -- Unclaimed disclosure (§ 51.2223)

Patentability -- Invention -- In general (§ 51.501)

Dictum in In re Lund, 153 USPQ 625, that continuation in part application is entitled to parent application's filing date as to all subject matter carried over into it from parent application for purposes of utilizing patent disclosure as evidence to defeat another's right to patent is modified to further include requirement that application whose filing date is needed to make rejection, must disclose, pursuant to Sections 120/112, invention claimed in reference patent; where continuation-in-part applications are involved, logic of holding of Alexander Milburn Co. v. Davis-Bournonville Co., 270 U.S. 390, would otherwise be inapplicable; without patentable invention's presence, no patent could issue "but for the delays of" Patent Office.

Particular patents -- Drying Method

Wertheim and Mishkin, Drying Method, rejection of claims 37, 38, and 44, reversed.

Case History and Disposition:

Appeal from Patent and Trademark Office Board of Appeals.

Application for patent of John H. Wertheim and Abraham Rudolph Mishkin, Serial No. 96,285, filed Dec. 8, 1970.

From decision rejecting claims 37, 38, and 44, applicants appeal. Reversed.

See also 191 USPQ 90 .

Attorneys:

William H. Vogt, III, Morris N. Reinisch, Dennis P. Tramaloni, and Marcus J. Millet, all of

New York, N.Y., for appellants.

Joseph F. Nakamura and Gerald H. Bjorge for Patent and Trademark Office.

Judge:

Before Markey, Chief Judge, and Rich, Baldwin, Miller, and Nies, Associate Judges.

Opinion Text

Opinion By:

Rich, Judge.

This appeal is from the decision of the Patent and Trademark Office (PTO) Board of Appeals (board) affirming the final rejection under 35 USC 103 of claims 37, 38, and 44 in application serial No. 96,285, filed by Wertheim and Mishkin (Wertheim) December 8, 1970, entitled "Drying Method." We reverse.

At the outset, we note the prolonged, if not tortuous, prosecution of the present application. During the past decade, this application has appeared before us once before, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (1976) (Wertheim I), and has been involved in an aborted interference, No. 99,688, with a reference patent used in the instant rejection, United States Patent No. 3,482,990 to Pfluger. Only two of the original forty-three claims are now before us, dependent claims 37 and 38, original claim 2 having been rewritten as independent claim 44, the principal claim on appeal.

The Invention

While the present and related inventions were described in Wertheim I, we give a synopsis of the claimed process, which is for freeze-drying coffee extract. Hot water is percolated through roasted and ground coffee beans to produce an aqueous coffee extract. After concentrating the extract to a point where its solids content is between 35% and 60%, it is charged with a gas to yield a foam. The pressure of the foam environment is regulated to be at least atmospheric pressure so as to avoid evaporative cooling, i.e., thermal loss resulting from vaporization of the aqueous portion of the extract. In the preferred embodiment of claim 37, the foam density is maintained between 0.4 grams per cubic centimeter (gm/cc) and 0.8 gm/cc. Finally, the foam is frozen at the regulated pressure and freeze-dried in a conventional manner. During these "cold" steps, the foam temperature allegedly must be maintained

below the eutectic temperature of the extract, i.e., the lowest possible constantmelting point of the mixture to avoid the loss of flavoring compounds through evaporation.

Applications and References

Since both appellants' case and the effective date of one of the references depend on earlier filing dates, we provide the chronological table below prior to discussing the reference disclosures and the rejection.

Table set at this point is not available. See table in hard copy or call BNA PLUS at 1-800-452-7773 or 202-452-4323.

The References

The primary reference, cited by the examiner under 35 USC 102(e), is the Pfluger patent which issued on the last of a series of four applications, as shown above. The patent discloses a foam/freeze-dried coffee process for retaining volatile aromatics during the foaming and freezing steps. Improved retention of these compounds is supposedly achieved by avoiding evaporative cooling of a concentrated coffee extract. The Pfluger patent, like appellants' application, calls for maintaining the foam below its eutectic temperature. Claim 2 of the Pfluger patent was copied by appellants for interference purposes and is claim 44 on appeal.

The Pfluger application chain developed as follows: Pfluger IV was designated a continuation of Pfluger III, [1] which was designated a continuation-in-part (CIP) of Pfluger II, which was designated a CIP of Pfluger I.

Pfluger I did not support all of the limitations of the claims copied from the Pfluger patent. Specifically, it did not disclose concentrating the extract to a solids content of between 35% and 60% prior to foaming. Express disclosure of this limitation did not occur until Pfluger III. It also did not expressly disclose always creating the foamed extract at at least atmospheric pressure, a limitation first found in Pfluger II.

The Sivetz publication is a secondary reference which discloses a non-foamed, freeze-dried coffee process. The vacuum drying of this process results in flaked coffee. The alleged advantage of this type of instant coffee is its excellent solubility in water. However, Sivetz states that "even under ideal freeze-drying conditions, the volatiles of coffee aroma and flavor are not retained any better, if as well, as in spray drying." It goes on to recommend less than 60% water content, and therefore a greater than 40% solids content, in any extract to be freezedried.

Flosdorf is an earlier publication also disclosing freeze-drying methods. It states that for economic reasons, one must produce freeze-dried coffee from extracts containing 40% to 50% solids.

The Rejection

In Wertheim I, this court held that interference claims 2 (now 44), 37, and 38 of appellants' still pending application were entitled to the benefit of the Swiss Wertheim application. Approximately eleven months later the PTO declared Interference No. 99,688 between the

present application and the Pfluger patent. Appellants were designated senior party because of their Swiss filing date. Pfluger was made junior party.

After considering four motions by Pfluger, the Primary Examiner moved sua sponte to dissolve the interference and granted his own motion. In support of his decision, he stated that the claims copied by Wertheim were unpatentable under 35 USC 102(e) and/or 35 USC 103 over the Pfluger I and II disclosure in view of Sivetz.

Ex parte prosecution was resumed and the claims on appeal were rejected. The great-grandparent of the Pfluger patent, Pfluger I, was said to be "carried forward" into the patent. The missing limitation in Pfluger I was supposedly found in Sivetz.

Page 558

Essentially, the rejection was based on, and was a modification of, the grounds stated in the dissolution decision. Appeal was then taken to the board.

After admitting in his Answer that the 1961 Pfluger application "fails to set forth specifically the values of the solids content within the range set forth in the Wertheim claims (35 to 60%)," the examiner said:

> The question which must be considered and answered is what one with ordinary skill in the art would derive from the following teaching on page 3 of the 1961 Pfluger application:
>
> > In many applications such foaming can be considerably increased by concentrating the solution or suspension to a relatively high solids content prior to incorporation of air or other gas such as nitrogen therein by whipping.
>
> The answer to the question presented is that it would be prima facie obvious to those with the ordinary skill in the art [to] which the subject matter relates to preconcentrate to the values set forth in the Wertheim claims. This conclusion is reached by the following reasoning.
>
> A patent specification is directed to those skilled in the art. Clearly, the data in the 1961 disclosure is not limited to the specific values set forth in the examples. The 1961 Pfluger disclosure teaches "concentrating * * * to a relatively high solids content" (page 3). When this teaching is viewed in the context of what is known in the art in the time frame of the instant subject matter, it would involve no more than ordinary skill of one in the art to pre-concentrate to the value claimed.
>
> As set forth previously, the record of Wertheim establishes that freeze drying is a well known procedure. Because it is expensive, it is economically advantageous to pre-concentrate prior to freeze drying. Sivetz et al. cited above, amplify on this (page 506 in particular). Sivetz et al. point out that freeze drying is much more expensive than spray

drying. Sivetz et al. also point out that (page 506 last two sentences):

> In freeze and belt vacuum drying, water content should be less than 60 percent. This reduces water evaporation load and drying cost.

Accordingly when the Pfluger patent is read in light of the 1961 application disclosure, whose date patentees are entitled to for benefit of filing date, taken with Sivetz et al., it would be obvious to the ordinary worker in the art to pre-concentrate to the value set forth in the claims.

The Board

The board reversed the rejection on §102(e) alone, but affirmed the §§102(e)/103 rejection. In doing so, it stated that the "Pfluger disclosure" was available as a reference under 35 USC 102(e). Yet, the §102(e) rejection was disapproved because not every material element in the appealed claims was disclosed in what the board called the "principal reference."

In awarding the Pfluger patent the benefit of the Pfluger I filing date, the board found "considerable guidance" from those portions of this court's opinion in Wertheim I dealing with process claims 6-14 and 16-29, supra 541 F.2d at 266 et seq., 191 USPQ at 99 et seq. It further noted that the disclosure from Pfluger II had been "carried forward into the patent." The Pfluger II disclosure was then compared to the Pfluger I disclosure, which states in pertinent part (quoted by the board):

> In accordance with the present invention the foregoing objectives are achieved with improved results along the lines indicated by:
>
> (1) freezing a foam containing food or pharmaceutical solids in suspension and/or solution to convert the water content thereof to a crystalline state; and
>
> (2) freeze drying the foamy mass thus created to a stable moisture content while maintaining the moisture thereof in a substantially solid state.

* * *

> In many applications such foaming can be considerably increased by concentrating the solution or suspension to a relatively high solids content prior to incorporation of air or other gas such as nitrogen therein by whipping. Although it is preferred that the foam be created in accordance with the present invention by whipping under atmospheric pressures and temperatures, the foam can also be created by other means such as inducing a superatmospheric pressure on the solution or suspension during agitation thereof (during which agitation extraneous gas such as nitrogen or carbon dioxide may be added) followed by sudden issuance of this solution or suspension from such a confined area of superatmospheric pressure to a reduced area of atmospheric or subatmospheric pressure such as occurs when the solution or suspension is caused to issue through

> an orifice or other suitable valve-operated aperture causing the food solids to foam under the influence of the pressure released. Other means for creating a foam involve the overt introduction to a solution or suspension of such means as dry ice, i.e., solid carbon dioxide in a suitable ground or particulate form, whereby carbon dioxide liberated upon subliming of the "dry ice" causes foaming of the solution or suspension to occur. Similarly, refrigerated air or nitrogen can be introduced to the solution or suspension to cause foaming thereof.
>
> The foam preferably has a high overrun whereby the density of the solution or suspension is changed from 1.0 gm. per c.c. to between .1-.5 gms. per c.c.

Although Pfluger I was said to "not mention 'avoiding evaporation' in connection with the foaming and freezing steps," the board found that this concept was expressed in the Pfluger prosecution as early as Pfluger II. Furthermore, it held that the avoidance of evaporative cooling was inherent in the procedure disclosed in Pfluger I, i.e., the creation of a foam at at least atmospheric pressure and the proscription against allowing the frozen foam to melt while being dried. On this basis, the board held that "the substance of the relevant disclosure in Pfluger I was carried forward into the patent."

The secondary references were held to properly establish the obviousness of "the degree of concentration" claimed in the Pfluger patent as of the filing of Pfluger I. Excerpts from both Sivetz and Flosdorf were quoted to demonstrate that concentrating aqueous coffee extracts above a 30% solids content was well known in the art. However, no distinction was made between concentrating extracts for foamed and non-foamed freeze-drying processes.

Reading the board opinion as a whole, it clearly appears that the obviousness rejection under §§102(e)/103 was sustained on the basis of teachings which the board found in Pfluger I, read as though it were a proper prior art reference, taken with further suggestions gleaned from Sivetz and Flosdorf, the secondary references. The board said:

> In conclusion, considering all the evidence, we hold that the Examiner properly relied on Sivetz and Flosdorf as establishing the obviousness of the degree of concentration required by the appealed claims in a process as taught by Pfluger.

Taken by itself, that statement does not show what teaching of Pfluger, out of all four applications, was meant, but the opinion makes clear it was talking about the 1961 Pfluger I application and more particularly, the one sentence therein, previously referred to, which stated:

> In many applications such foaming can be considerably increased by concentrating the solution or suspension to a relatively high solids content prior to incorporation of air or other gas such as nitrogen therein by whipping.

Opinion

At the outset, we wish to set forth and characterize the exact nature of the rejection and its statutory basis. While the board stated the rejection to be based upon 35 USC 103, we note that it is more properly viewed as a 35 USC 102(e)/35 USC 103 rejection. Because this distinction is the focal point of our decision to reverse, a short discussion of the nature of this rejection follows.

I. §§102(e)/103 Rejections

[1] Section 102(e), a codification of the rule of Alexander Milburn Co., v. Davis-Bournonville Co., 270 U.S. 390 (1926), reads as follows:

> A person shall be entitled to a patent unless --
>
> * * *
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent * * *.

In Milburn, a patent infringement suit, the court held that material disclosed but not claimed in a United States patent may be used as a reference to anticipate a later invention as of the date the reference application was filed, rather than the date the patent finally issued.

The plaintiff in that case sued for infringement of Whitford's patent, which had issued on June 4, 1912, after being applied for on March 4, 1911. One Clifford had filed an application for a patent on January 31, 1911, which "gave a complete and adequate description of the thing patented to Whitford but * * * did not claim it." A patent issued to Clifford on February 6, 1912. Whitford could not prove a date of invention prior to his application date and, thus, his date of invention was after the Clifford

application date but before the date Clifford's patent issued.

Although Clifford's application was not a matter previously "known or used," nor a patent or a printed publication, the Supreme Court reasoned that "the delays of the Patent Office ought not to cut down the effect of what has been done." The Clifford application was thus held to be prior art against the Whitford patent as of the former's filing date.

The Supreme Court in Hazeltine Research Inc. v. Brenner, Com'r., 382 U.S. 252, 147 USPQ 429 (1965), subsequently held that Milburn and §102(e) may be applied to determine what is "prior art" under the §103 requirement. Section 103 states in relevant part that

> A patent may not be obtained * * * if the differences between the subject matter sought to be patented and the *prior art* are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in

> the art to which said subject matter pertains. [Emphasis ours.]

While nowhere in Title 35 are the words "prior art" defined, the Senate and House Reports accompanying the 1952 Patent Act state:

> [Section 103] refers to the difference between the subject matter sought to be patented and the prior art, meaning what was known before as described in Section 102. S.Rep. No. 1979, 82d Cong., 2d Sess., U.S. Code Cong. & Admin. News at 2399. [The House Report No. 1923 is the same.]

Additionally, one draftsman of and the commentator on the 1952 Act, P. J. Federico, commented that:

> The antecedent of the words "the prior art" * * * lies in the phrase "disclosed or described as set forth in Section 102" and hence these words refer to the material specified in Section 102 as the basis for comparison. Federico, Commentary On The New Patent Act, 35 USCA p. 1 at 20 (1954).

Commensurate with the Senate Report and Mr. Federico's commentary, we have held that the term "prior art" refers "to at least the statutory prior art material named in §102." In re Yale, 52 CCPA 1668, 347 F.2d 995, 146 USPQ 400 (1965). See In re Harry, 51 CCPA 1541, 333 F.2d 920, 142 USPQ 164 (1964).

In Hazeltine, the court stated that earlier-filed applications for patents of another describing, although not necessarily claiming, the invention claimed in a later-filed application, are prior art under §102(e) and are available for consideration in support of a §103 obviousness rejection of the later-filed application. See In re Bowers, 53 CCPA 1590, 359 F.2d 886, 149 USPQ 570 (1966). And, for purposes of both §102 and §103 analysis, they are prior art as of their filing dates.

In Hazeltine, Regis filed an application for patent on December 23, 1957. The examiner rejected the claims as obvious under §103 in view of the disclosures of two patents, Carlson and Wallace. Carlson was issued eight years earlier and was clearly a valid reference, Wallace, however, was pending at the time of Regis' application, and had been filed almost four years earlier, prompting Regis to argue that it was not "prior art" because its disclosures were secret and not known to the public. In dismissing this argument, the Supreme Court stated (p. 255, 147 USPQ at 431):

> Petitioners suggest * * * that the question in this case is not answered by mere reference to §102(e), because in Milburn, which gave rise to that section, the co-pending applications described the same identical invention. But here the Regis invention is not precisely the same as that contained in the Wallace patent, but is only made obvious by the Wallace patent in light of the Carlson patent. We agree with the Commissioner that this distinction is without significance here. While we think petitioners' argument with regard to §102(e) is interesting, it provides no reason to depart from the plain holding and

> reasoning in the Milburn case. The basic reasoning upon which the Court decided the Milburn case applies equally well here. When Wallace filed his application, he had done what he could to add his disclosures to the prior art. The rest was up to the Patent Office. Had the Patent Office acted faster, had it issued Wallace's patent two months earlier, there would have been no question here. As Justice Holmes said in Milburn, "The delays of the patent office ought not to cut down the effect of what has been done." P. 401.

[2] The §§102(e)/103 rejection, thus, is one utilized where §102(e) alone may fail because not every material limitation of the claimed invention is disclosed in the reference. That reference, referred to as "prior art" in §103, may be combined with another to support an obviousness rejection.

See In re Caveney, 55 CCPA 721, 386 F.2d 917, 155 USPQ 681 (1967).

A different situation arises where, unlike Milburn or Hazeltine, the reference patent issues not after only one application, but after a series of applications. In other words, after permitting the use of a patent reference in both §102(e) and §§102(e)/103 rejections as of the reference filing date, the next question confronting the courts was what filing date was to be accorded a reference patent which issues after a series of applications. How far back can one extend the effective date of a reference patent as "prior art" in such a case?

II. 102(e) and Continuation Applications

In In re Lund, 54 CCPA 1361, 376 F.2d 982, 153 USPQ 625 (1967), this court was called upon to decide whether a certain compound disclosed in Example 2 of an application filed by Margerison on September 29, 1958, was available as prior art as of that filing date to reject Lund's claims, which were presented in an application filed almost a year later. Although Margerison abandoned the application, he had filed a continuation-in-part application, without Example 2, which resulted in issuance of the reference patent. The court stated it to be

> * * * well settled that where a patent purports on its face to be a "continuation-in-part" of a prior application, the continuation-in-part application is entitled to the filing date of the parent application as to all subject matter *carried over* into it from the parent application, whether for purposes of obtaining a patent or subsequently utilizing the *patent* disclosure as evidence to defeat another's right to a patent. [Emphasis in original.]

In deciding what had been "carried over," the court held that merely designating an application as a continuation-in-part was not sufficient to incorporate by reference the disclosure of the abandoned application into the patent disclosure, "as if fully set out therein." The court concluded that:

> It seems to us that the sine qua non of §102(e) and the Milburn case is that, consistent with the gain to the public which the patent laws mean to secure, a *patent must issue*

> which contains, explicitly or implicitly, the description of an invention which is to be relied on to defeat a later inventor's patent rights. It does not appear that the patentee here has done "all that he could do to make his description public," Milburn, supra, for the language Margerison employs is not sufficient to incorporate the description of his earlier application into the patent and the description which the Patent Office relies upon appears only in the earlier application. [Emphasis in original.]

In In re Klesper, 55 CCPA 1264, 397 F.2d 882, 158 USPQ 256 (1968), the PTO rejected Klesper's claims as fully anticipated by a Frost patent under §102(e) because Klesper could not antedate the effective date of the reference. The issue before this court was what that effective date was. Frost and Klesper had filed applications for patent on October 20, 1955, and September 18, 1956, respectively. Frost then filed a continuation-in-part application on April 1, 1959, which application culminated in the issuance of a patent on January 8, 1963, containing the 1959 disclosure. On January 6, 1964, Klesper filed a continuation-in-part application. The PTO gave the Frost patent the benefit of its parent filing date, October 20, 1955.

The court stated that §102(e) was a codification of the historical treatment of a U.S. patent disclosure "as prior art as of the filing date of the earliest U.S. application to which the patent is entitled, provided the disclosure was contained in substance in the said earliest application." Thus, the determinative question became whether or not the subject matter of the appealed claims was disclosed both in the abandoned application and in the patent. The court agreed with the PTO conclusion that:

> * * * Frost's abandoned application discloses the subject matter of the appealed claims and it is admitted that that subject matter is contained in the reference patent. It follows that it was carried forward and that the effective date of the patent as a prior art reference against the appealed claims under section 102(e) is October 20, 1955, which antedates appellant.

The Klesper case thus dealt with the dating back of a patent reference to gain the benefit of an earlier filing date. Lund was not so concerned, however, and considered only whether a disclosure appearing *only* in an abandoned application was to be regarded as prior art under §102(e). Both cases involved rejections based upon §102(e) alone.

[3] We now come to the situation in the instant case, one which we believe has not heretofore been before us. [2] What patent dis

closure, or portion thereof, which has been "carried over" through a chain of applications, may be traced back to an earlier application and given its effective date, and then combined with a secondary reference to reject later filed claims under §§102(e)/103?

III. Continuing Applications and Rejections Under §§102(e)/103

We begin by noting the factual differences between this case and Hazeltine. In Hazeltine the Court utilized *all* of the reference patent disclosure as prior art. But because that disclosure was insufficient to support a rejection under §102(e) alone, the Court approved combining it with a second reference for purposes of determining obviousness. In this case, utilization of all the reference patent disclosure would, of course, suffice to support a rejection, *if* its date is early enough, because Wertheim copied the Pfluger patent claims for interference. *That* disclosure, however, cannot be given an effective filing date early enough to antedate the Wertheim Swiss filing date. See Wertheim I. The PTO, therefore, has abstracted a *part* of the entire patent disclosure set forth in a Pfluger application dated prior to the Wertheim Swiss filing date, found it "carried over" into the patent, and, on the supposed authority of Lund and Hazeltine, used it in combination with a second reference to reject the Wertheim claims as obvious. For reasons which follow, we hold that was erroneous.

A. The Rejection

In the instant case, the examiner relied on Pfluger patent 3,482,990 and the Sivetz et al. publication and rejected the claims "under 35 USC 102(e) and/or 103 as unpatentable over Pflugger * * * in view of Sivetz et al.," saying that "Pfluger is entitled to the benefit of" Pfluger's 1961 filing date. The examiner also said, "Note 35 USC 120," but made no specific application thereof. Without addressing the relevance of this statute, the board said:

> We will *not* affirm the rejection based solely on 35 U.S.C. 102(e), although we recognize that the Pfluger disclosure is available as a reference under the provisions of 35 U.S.C. 102(e).
>
> Here one of the contested issues is whether the *principal reference* discloses concentrating the extract to the specific "higher solids level of between 35% and 60% soluble solids." Secondary references may well establish the *obviousness* of the quoted figures, but in that case *the rejection is under 35 U.S.C. 103* rather than *rejection is under 35 U.S.C. 103* rather than 35 U.S.C. 102. [Emphasis ours.]

The board was there distinguishing In re Samour, 571 F.2d 559, 197 USPQ 1 (CCPA 1978), wherein this court said, "every material element of the claims was disclosed in the principal reference." It thus appears that the board was pointing out, backhandedly, that every material element of the Wertheim-Pfluger claims was *not* disclosed in the "principal reference."

[4] It is of further interest to consider what the board meant in the above quotation by "principal reference" in referring to the instant case. The examiner's "principal reference" was the Pfluger patent; but there is no question that it discloses every element of the claims on appeal, which claims were copied by Wertheim from that patent. Therefore, the board could not have been referring to the Pfluger *patent* as the "principal reference" and the only possible deduction is that it was referring to the Pfluger I application. Therein lies its first error, for an abandoned application by itself can never be a reference. In any event, on the basis of the failure of disclosure in Pfluger I noted above, the board refused to sustain the rejection on §102(e) alone,

and affirmed only the rejection of the claimed invention as obvious under §103.

B. Section 103

[5] In every case, "the invention" referred to in §103 is nothing more nor less than the subject matter being claimed by the applicant, which is the starting point of all inquiry about obviousness. Claim 44, the independent claim at bar, reads:

> An improved process for minimising [sic] loss of volatiles during freeze-drying of coffee extract which comprises obtaining coffee extract, concentrating said extract to a higher solids level *of between 35% and 60% soluble solids,* foaming said concentrated extract to a substantial overrun by injection of a gas into said extract at at least atmospheric pressure *to thereby avoid evaporative cooling due to evaporation of water* in said extract during said foaming, freezing said foam to below its eutectic point at at least atmospheric

> pressure *while avoiding evaporative cooling,* and freeze-drying said extract at below the eutectic temperature of said extract. [Emphasis ours.]

Claim 37 merely adds the limitation that the overrun density be between 0.4 to 0.8 gm/cc, and claim 38 adds a different limitation, freeze drying at a pressure of about 150 to 175 microns.

[6] Looking now to the basis of the §103 rejection, regardless of what may have been in the minds of the board members, the principal reference to support this rejection is Pfluger patent No. 3,482,990. Does it show that all or part of the claimed invention was in the "prior art"? Of course, it shows *all* of the claimed invention. The claims were copied from it by Wertheim and if it did not contain a complete description of the claimed invention it would not have been issued by the PTO. It issued, however, on December 9, 1969, and Wertheim has already been held entitled to an invention date at least as early as April 2, 1965, so what evidence does the patent contain that the patent disclosure was "prior art" with respect to Wertheim? As a patent or as a publication, the answer, of course, is none. How, then, does it function as a §103 "reference"? It is at this point that the PTO invokes §102(e) on the authority of Hazeltine and makes the argument next to be described.

C. Sections 102(e) and 120

We are asked by the PTO to apply the "carried over" principle set forth in Klesper to the present §§102(e)/103 rejection. Specifically, the solicitor argues that since this court said in Wertheim I that Pfluger II was "carried forward" into the Pfluger patent, and Pfluger I discloses essentially the same invention as Pfluger II, the Pfluger reference patent must be awarded the benefit of the Pfluger I filing date. [3]

In responding to this argument, we first note that the Pfluger patent issued after a series of

applications, the initial one (I), two continuation-in-part applications (II and III), and a continuation application (IV). Let us assume that Pfluger I disclosed subject matter A. Because two continuation-in-part applications followed, II may be said to contain subject matter AB, B representing new matter, and III may be said to contain ABC, C representing the additional new matter in that application. Continuation application IV, of course, also contains subject matter ABC.

Instead of determining what filing date the Pfluger *patent* was entitled to as a §102(e) reference for purposes of the §§102(e)/103 rejection, however, the board relied upon the language in Lund, that a disclosure which is "carried over" into the patent from previous applications may be used to defeat the patent rights of another inventor. In other words, rather than examining the Pfluger patent in the light of §§120 and 112, it reached back to Pfluger I and retrieved A, found it "carried over" into the patent and combined it with a secondary reference to find the Wertheim invention obvious.

[7] Although this court apparently embraced this procedure in Wertheim I, such an approach in a situation where there are continuation-in-part applications ignores the rationale behind the Supreme Court decisions in Milburn and Hazeltine that "but for" the delays in the Patent Office, the patent would have earlier issued and would have been prior art known to the public. The patent disclosure in Milburn was treated as prior art as of its filing date because at the time the application was filed in the Patent Office the inventor was presumed to have disclosed an invention which, but for the delays inherent in prosecution, would have been disclosed to the public on the filing date. A continuation-in-part application, by definition, adds new matter to the parent application previously filed. Thus, the type of new matter added must be inquired into, for if it is critical to the patentability of the claimed invention, a patent could not have issued on the earlier filed application and the theory of Patent Office delay has no application.

Additionally, it is at this point in the analysis that §120 enters the picture, for the

phrase in §102(e), "on an *application* for patent," necessarily invokes §120 rights of priority for prior co-pending applications. If, for example, the PTO wishes to utilize against an applicant a part of that patent disclosure found in an application filed earlier than the date of the application which became the patent, it must demonstrate that the earlier-filed application contains §§120/112 support for the invention claimed in the reference patent. For if a patent *could not* theoretically have issued the day the application was filed, it is not entitled to be used against another as "secret prior art," the rationale of Milburn being inapplicable, as noted above. In other words, we will extend the "secret prior art" doctrine of Milburn and Hazeltine only as far as we are required to do so by the logic of those cases.

[8] Initially then, the question becomes the familiar one of which filing date the Pfluger patent is entitled to for various purposes, including its effectiveness as a §102(e) reference under §103 evidencing "prior art." Lund, supra. It is clear that it cannot be used as a reference under §102(e) *alone* against the Wertheim invention as of the date of a Pfluger application which does

not describe the Wertheim invention, as claimed. See In re Smith, 59 CCPA 1025, 458 F.2d 1389, 173 USPQ 679 (1972).

[9] The conditions under which a filing date earlier than that of the last in a series of applications on which a patent issues may be accorded to a patent *with respect to any given claimed subject matter* are clearly set forth in §120:

> An application for patent *for an invention* disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States by the same inventor shall have the same effect, *as to such invention,* as though filed on the date of the prior application * * *. [Emphasis ours.]

We omit the balance of the section because there is no question here about compliance with its terms. The first paragraph of §112 reads:

> The specification shall contain a written description *of the invention,* and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out *his invention.* [Emphasis ours.]

[10] We emphasize that the above noted statutes, §§102(e), 120, and 112, speak with reference to some specific claimed subject matter by use of the terms emphasized. It is axiomatic in patent law that questions of description, disclosure, enablement, anticipation, and obviousness can only be discussed with reference to a specific claim which identifies "the invention" referred to in the statutes.

[11] Thus, the determinative question here is whether the invention claimed in the Pfluger patent finds a *supporting disclosure in compliance with §112,* as required by §120, in the 1961 Pfluger I application so as to entitle that invention in the Pfluger patent, as "prior art," to the filing date of Pfluger I. Without such support, the invention, and its accompanying disclosure, cannot be regarded as prior art as of that filing date.

[12] As previously noted, new matter can add material limitations which transform an unpatentable invention, when viewed as a whole against the prior art, into a patentable one. A continuation-in-part application, unlike a continuation application, does not necessarily insure that all critical aspects of the later disclosure were present in the parent. Thus, in a situation such as this, only an application disclosing the patentable invention before the addition of new matter, which disclosure is carried over into the patent, can be relied upon to give a reference disclosure the benefit of its filing date for the purpose of supporting a §§102(e)/103 rejection.

D. The Pfluger I Disclosure

Although the board and the examiner have tacitly, if not expressly, admitted that Pfluger I does not disclose the claimed invention -- indeed, that fact can be implied from the §103

rejection for obviousness as well as from the board's reversal of the rejection based on §102(e) alone -- we here devote some necessary discussion to this factual issue.

[13] In the course of answering appellants' argument that they had been put into a situation where they could not contest priority with Pfluger or take advantage of 37 CFR 1.131, the board said:

> This situation arises because, under 35 U.S.C. 102(e), the Pfluger patent has an effective date, with respect to the relevant subject matter, of March 24, 1961. Appellants have offered no evidence to antedate said date.

The only date the Pfluger patent has *under §102(e)* is February 10, 1969, the filing date of Pfluger IV, the application on which the patent issued. Any earlier U.S. filing date for the patent necessarily depends on further compliance with §§120 and 112. The board appears to have assumed the existence of the very point at issue here -- whether the patent reference *is* entitled to a March 24, 1961, filing date.

We take note of two claim limitations missing from Pfluger I but present in the Pfluger patent which answer the question of whether to award the 1961 filing date to the §102(e) reference patent disclosure. Pfluger I did not expressly disclose either concentrating the coffee extract to a 35% to 60% solids content, or avoiding evaporative cooling during the foaming and freezing steps. If either limitation, later added as new matter, resulted in the disclosure of a patentable invention for the first time, it is relevant to our determination of whether the Pfluger patent receives the benefit of the Pfluger I filing date.

The board did not "attach any significance" to the absence of express language disclosing the avoidance of evaporative cooling. Since the Pfluger I application disclosed gas injection into the extract "at at least atmospheric pressure," the board held that the above concept was inherently disclosed in the Pfluger I method.

Moreover, the board gave little weight to the addition of a solids content range in Pfluger III. Even though the examples in Pfluger I did not illustrate concentrating coffee extracts above 30%, the general statement in Pfluger I about concentrating extracts was said not to be limited in scope to the specific examples. Thus, the board apparently did not find either of the above claim limitations to be new matter, much less relevant new matter.

A closer examination of the Pfluger file history reveals that the above limitations were relevant, indeed, critical new matter. From Pfluger II on, the patentee argued with the examiner over that feature of his process which he believed made the invention patentable -- the avoidance of evaporative cooling. However, it was not until after the filing of Pfluger III that the first allowance of claims occurred. There the patentee successfully distinguished the prior art by expressly stating the conditions under which such cooling is avoided. Both at least a 35% solids

content and foaming under "conditions which avoid the evaporation of water" were allegedly necessary for allowance. It was the combination of these steps, and others, which was held to be a patentable invention and deemed allowable by the examiner in Pfluger III. In fact, during the prosecution of Pfluger IV, the examiner required that Pfluger specify the minimum level of concentration for the coffee extract -- at least 35%.

[14] The board erred in ruling that since "the substance of the relevant disclosure in Pfluger I was carried forward into the patent," that same disclosure in the reference patent was entitled to the Pfluger I filing date, *even though the entire patent was not.* While some of the reference patent disclosure can be traced to Pfluger I, such portions of the original disclosure cannot be found "carried over" for the purpose of awarding filing dates, unless that disclosure constituted a full, clear, concise and exact description in accordance with §112, first paragraph, of the invention claimed in the reference patent, else the application could not have matured into a patent, within the Milburn §102(e) rationale, to be "prior art" under §103.

The two claim limitations of the reference patent missing from Pfluger I were a necessary part of the only patentable invention ever set forth in the Pfluger file history. These limitations, however, were neither expressly nor inherently part of the original Pfluger disclosure. Absent these steps, the Pfluger I filing date cannot be accorded to the Pfluger patent reference. Without that date, the reference does not antedate Wertheim's alleged actual reduction to practice and cannot be combined with another reference to support a §103 rejection.

To look at it another way, without the benefit of the Pfluger I filing date, that part of the reference patent disclosure relied upon cannot be said to have been incipient public knowledge as of that date "but for" the delays of the Patent and Trademark Office, under the Milburn rationale. Here, it cannot be said to have been "carried over" into the reference patent for purposes of defeating another's application for patent under §§102(e)/103.

[15] The dictum in Lund, [4] supra, that * * * the continuation-in-part application is entitled to the filing date of the

Page 566

parent application as to all subject matter *carried over* into it from the parent application * * * for purposes of * * * utilizing the *patent* disclosure as evidence to defeat another's right to a patent * * * [emphasis in original]

is hereby modified to further include the requirement that the application, the filing date of which is needed to make a rejection, must disclose, pursuant to §§120/112, the invention claimed in the reference patent. Where continuation-in-part applications are involved, the logic of the Milburn holding as to secret prior art would otherwise be inapplicable. Without the presence of a patentable invention, no patent could issue "but for the delays of" the PTO.

Conclusion

Since the patent disclosure used in the present rejection is not effective as a reference as of the Pfluger I filing date, the decision of the board affirming the §§102(e)/103 rejection of claims 37, 38, and 44 is *reversed.*

Reversed.

Footnotes

Footnote 1. Pfluger III received a notice of allowance but did not issue. Instead, Pfluger filed a continuation, Pfluger IV.

Footnote 2. A similar fact situation may have been before this court in In re Switzer, 35 CCPA 1013, 1019, 166 F.2d 827, 831, 77 USPQ 156, 159 (1948). However, because the reasoning of the court is unclear, the opinion lends no aid to resolution of the dispute at hand.

Footnote 3. In Wertheim I, this court apparently relied upon Lund and, with regard to "noninterference" claims not now in issue, stated that, "we will apply as prior art under §102(e) * * * those portions of the Pfluger patent disclosure that were carried forward from [Pfluger II]." 541 F.2d at 266, 191 USPQ at 99.

In this case, unlike Wertheim I, the board and the examiner rely upon the Pfluger I filing date, not the Pfluger II filing date. Therefore, we need not, and do not, reach any conclusions as to whether the latter date is effective against either the present "interference" claims or the "noninterference" claims of Wertheim I. We note, however, that the court in Wertheim I evidently did not utilize the principles of law we herein announce, which include a modification of the Lund dictum. See note 4 and accompanying text infra.

Footnote 4. It was dictum because the only relevant holding in Lund was that matter *not* carried over could not be used as evidence of prior art. The quoted passage in the text was not necessary to the decision.

- End of Case -

